

FME in Action

Ken Bragg

European Services Manager



**WORLD TOUR
2015**

#fmewt



5 Topics



1. An Update on Databases



2. Working with Raster & Point Clouds



3. FME and Data Validation



4. Real Time Data



5. Performance



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1. An Update on Databases



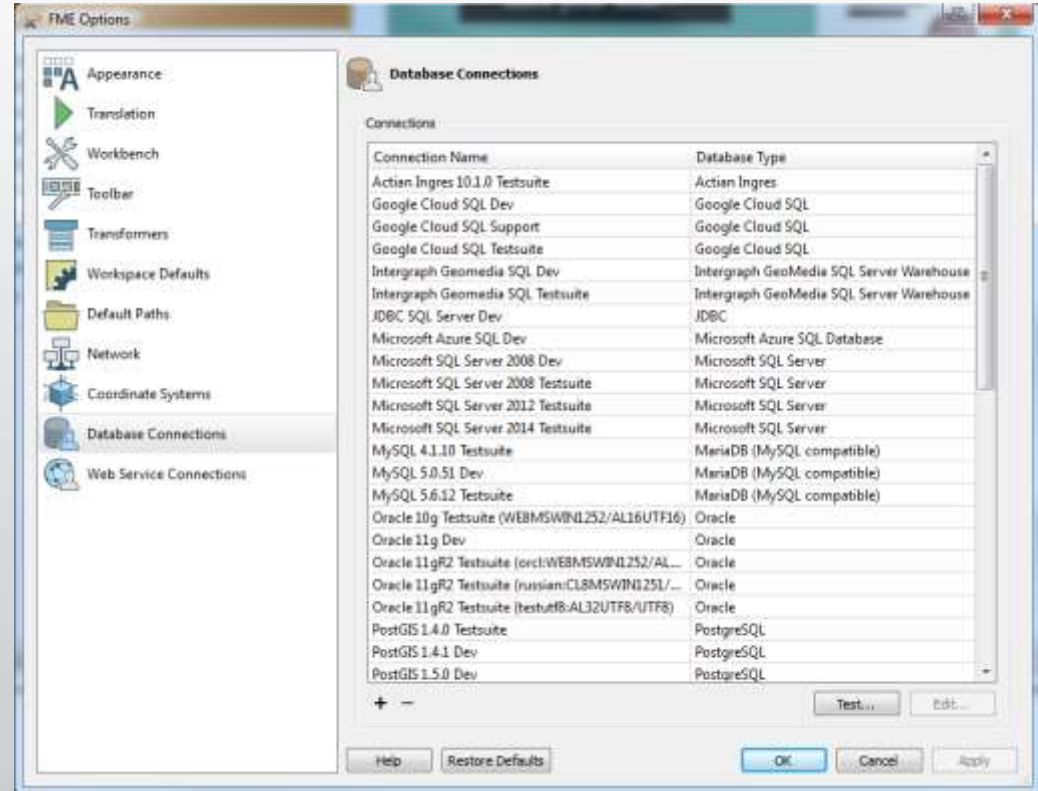
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Named Connections



Tools > FME Options >
Database Connections

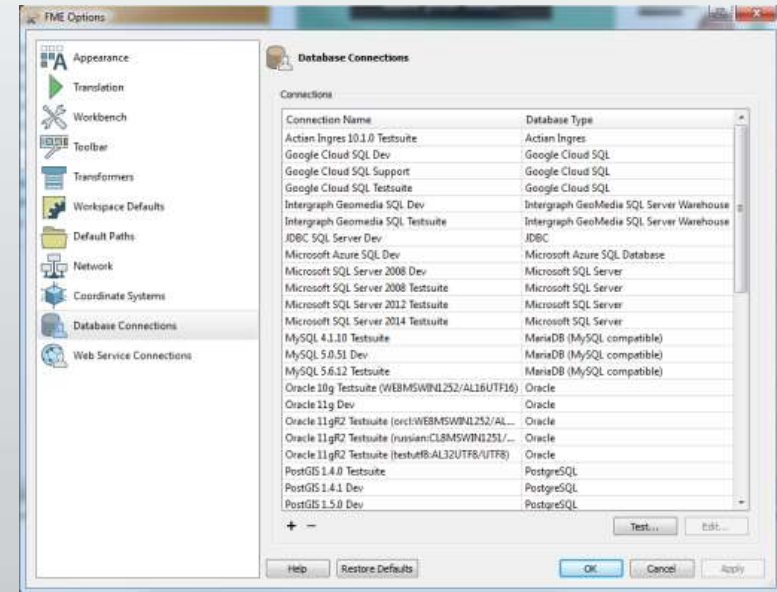
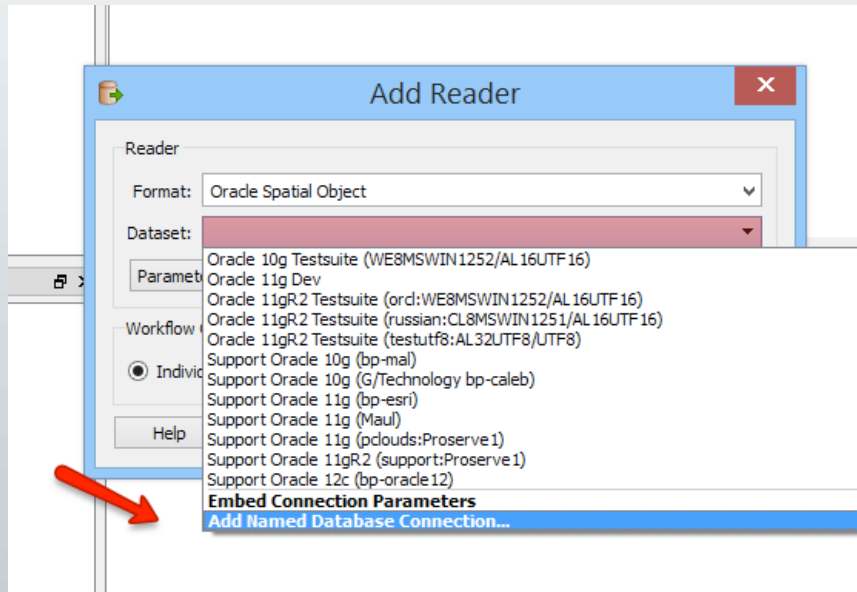


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Named Connections



- Define when adding reader or writer
- ...or Tools – FME Options

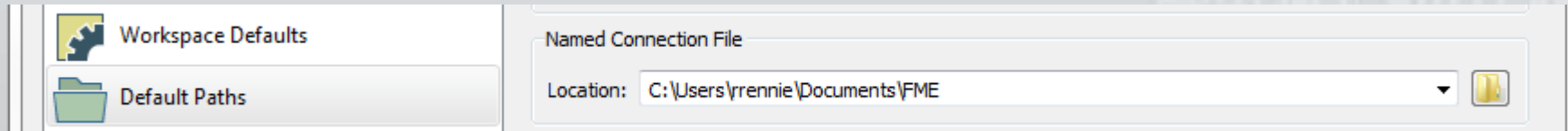


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Named Connections



- Available for all database formats except Geodatabase and SDE
- Available in related transformers
- Shareable
- Publishable

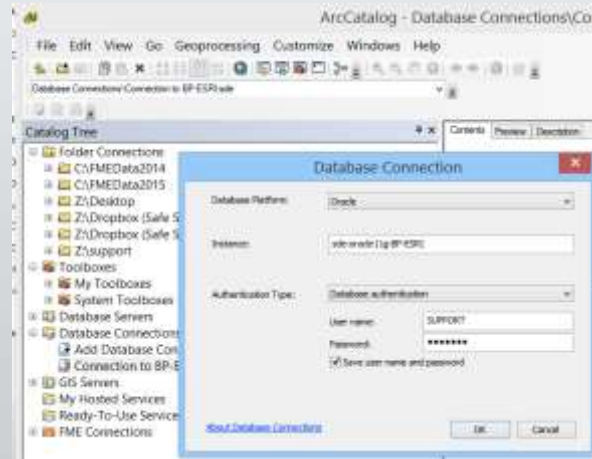


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Named Connections



- Geodatabase SDE & ArcSDE use .sde connection files
- Define in ArcCatalog/ArcMap first



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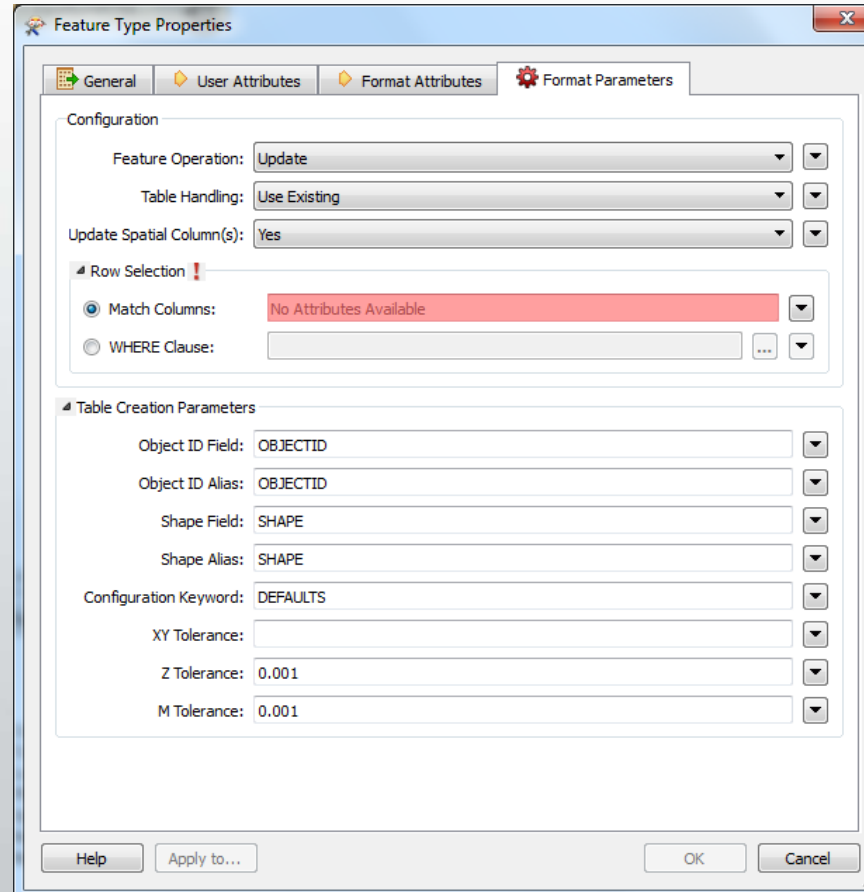
Writer Harmonization



- Project to improve and simplify the setting up of database updates to make inserts, updates, deletes easier
- Done for SQL Server family of formats
- Done for FileGDB writer
- Done for JDBC writer

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Writer Harmonization



The image shows a screenshot of the 'Feature Type Properties' dialog box, specifically the 'Format Parameters' tab. The dialog is titled 'Feature Type Properties' and has a close button (X) in the top right corner. It contains several sections for configuring feature operations and table creation.

Configuration

- Feature Operation: Update
- Table Handling: Use Existing
- Update Spatial Column(s): Yes

Row Selection

- Match Columns: No Attributes Available
- WHERE Clause:

Table Creation Parameters

- Object ID Field: OBJECTID
- Object ID Alias: OBJECTID
- Shape Field: SHAPE
- Shape Alias: SHAPE
- Configuration Keyword: DEFAULTS
- XY Tolerance:
- Z Tolerance: 0.001
- M Tolerance: 0.001

At the bottom of the dialog, there are buttons for 'Help', 'Apply to...', 'OK', and 'Cancel'.

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JDBC



- New format – Java based database connection
- Many providers for many formats
- Read – FME Professional Edition
- Write – FME Database Edition

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JDBC



- Accessed as jdbc:<subprotocol> :
- Uses named connection technology
- Writer has new harmonized layout
- Allows access to cloud databases
- More details on [FMEPedia](#)

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Exploring Raster & Lidar Data with FME



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Raster Terminology

| IFMERaster | |
|-----------------------------|-------------------------------|
| Min Extents | 0.0, -334.0 |
| Max Extents | 220.0, 0.0 |
| Resolution (Columns x Rows) | 220 x 334 Pixels |
| Origin | 0.0, 0.0 |
| Spacing | 1.0, 1.0 |
| Rotation in Radian CCW | 0.0, 0.0 |
| Cell Origin | 0.5, 0.5 |
| Affine Transform | 1.0, 0.0, 0.0, 0.0, -1.0, 0.0 |
| Number Of Bands | 3 Bands |
| Band 0 (RED8) | |
| Number Of Rows Per Tile | 1 |
| Number Of Columns Per Tile | 220 |
| Band 1 (GREEN8) | |
| Number Of Rows Per Tile | 1 |
| Number Of Columns Per Tile | 220 |
| Band 2 (BLUE8) | |
| Number Of Rows Per Tile | 1 |
| Number Of Columns Per Tile | 220 |

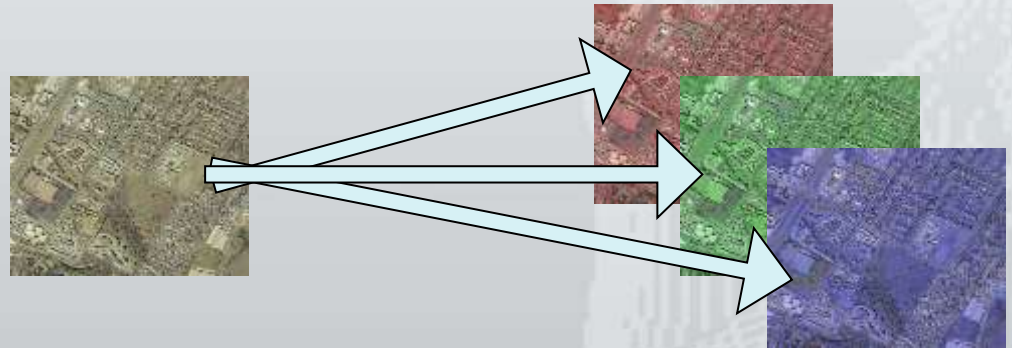


- Band
- Palette
- Origins and extents
- Data type

Working with Bands



- Band Management
- Combining and Separating Bands
- Selecting Bands

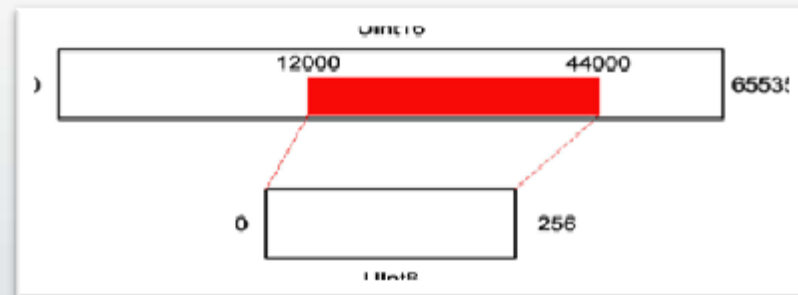


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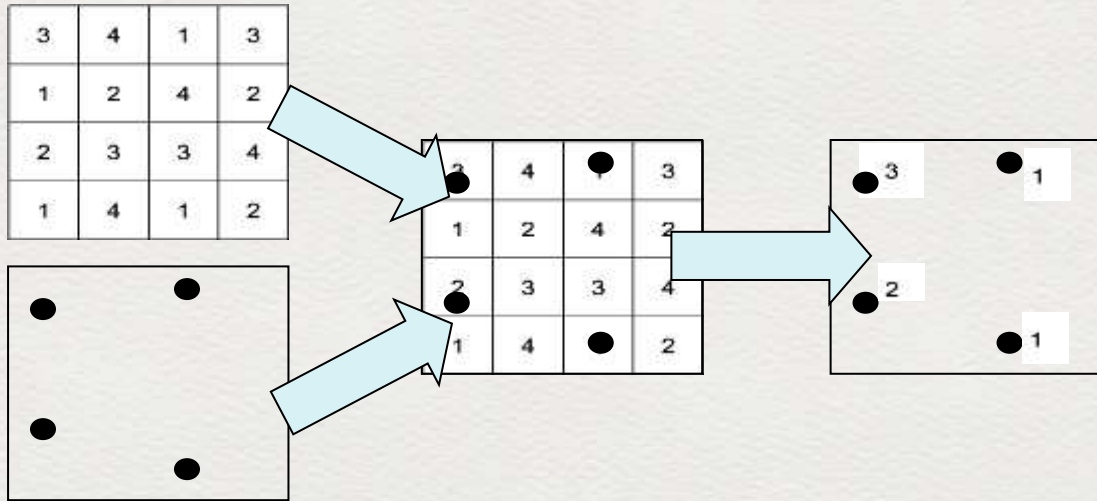


Key to Format Conversion: Interpretation

- Data Type
- Bit Depth
- Data Interpretation
- Palettes vs Bands
- **RasterInterpretationCoercer**



Raster and Vector Interaction



Working with vector and raster data simultaneously



Raster Cell Manipulation & Algebra

Raster Cell Calculations:

- RasterCellValueReplacer
- RasterCellValueCalculator
- RasterExpressionEvaluator

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|----------|---|---|---|---|---|----------|---|---|----|---|---|
| 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 7 | 7 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 7 | 7 | 0 |
| 0 | 0 | 7 | 7 | 0 | + | 3 | 3 | 3 | 0 | 0 | = | 3 | 3 | 10 | 0 | 0 |
| 0 | 0 | 7 | 0 | 0 | | 3 | 3 | 3 | 0 | 0 | | 3 | 3 | 10 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |

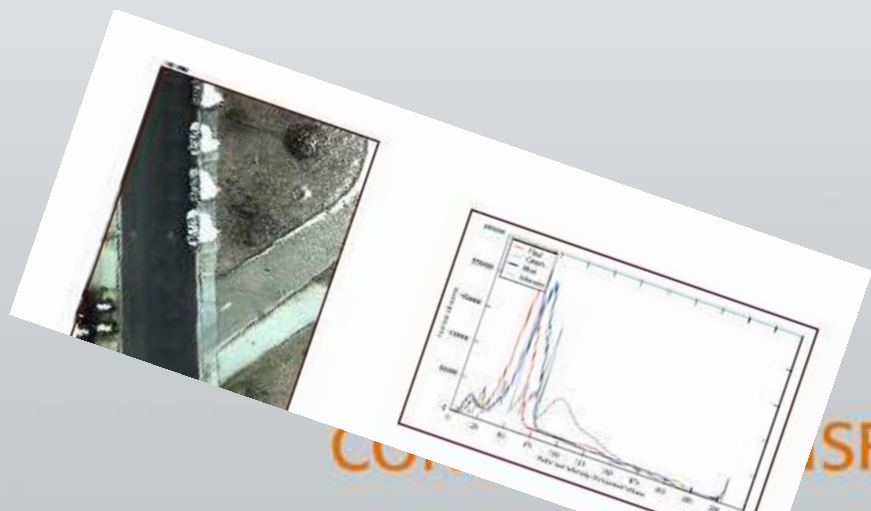
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Reports with Pictures!

“...a big part of GIS work is making a PDF site location map that’s going to go into a forgotten report...”

Marc Pfister from Geohipster



FME and Point clouds



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Translate Point Cloud



- LAS Reader/Writer
- LAZ Reader and Writer - Using LAStools Open Source LASZip technology (<http://laszip.org>)
- RIEGL Laser Scan Database
- Oracle Spatial Point
- Terrasolid TerraScan
- XYZ
- Z+F LaserControl ZFS Reader
- ESRI Read and Write LASD meta data

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Formats



- NEW Formats:
 - CARIS Spatial Archive (CSAR) Point Cloud
 - Mojang Minecraft (covered in 3D presentation)
- Updated Format:
 - LAS 1.3 and 1.4 support
 - Esri zLAS (FME 2015.1)

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Transformers



- PointCloudComponent...
- PointCloudCoercer
- PointCloudCombiner
- PointCloudCreator
- PointCloudExpressionEvaluator
- PointCloudThinner
- PointCloudFilter
- PointCloudOnRasterComponentSetter
- PointCloudPropertyExtractor
- PointCloudSplitter

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New Transformers



- PointCloudSorter
- PointCloudMerger
- PointCloudStatisticsCalculator

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Usage example



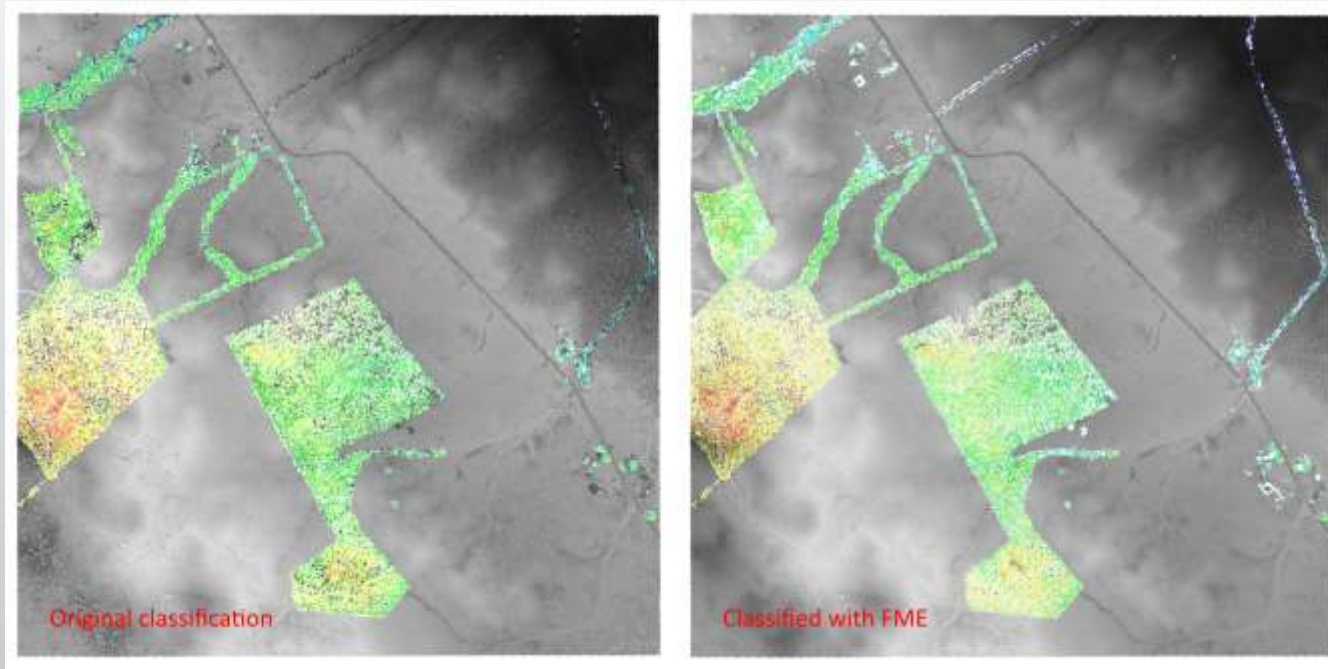
- Several scenarios in a single workspace:
 - Classification
 - Biomass calculation
 - Feature Extraction

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Usage example



- Classification



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Meet the *SharedItem* Family



- 4 new transformers to manipulate:
 - Appearances
 - Textures
 - Rasters in textures
 - Geometry Definitions (Instances)

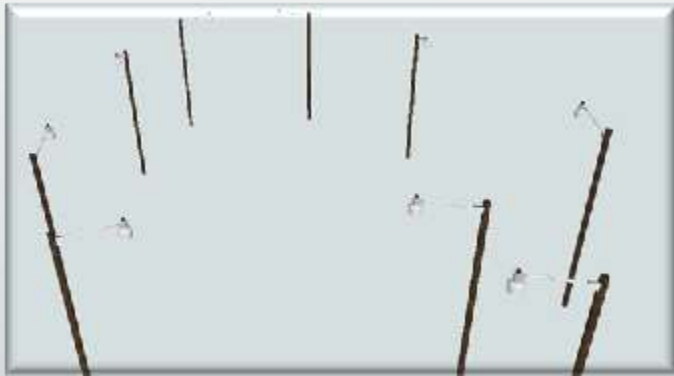


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New transformers in action



- Replacing Instances



Replace these...



..with this...



...and get this

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FME and Data Validation



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Why are we talking about this?

- Bad data costs time, money and even lives.



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Why are we talking about Validation and Quality Control?



- FME and FME Server are powerful tools for checking data and providing feedback
- Many partners, integrators and users use FME today for Validation and Quality Control



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What can we check?

- ☑ Schema
 - Feature Type Name
 - Attribute Present
 - Attribute Names
 - Attribute Data Types
 - Coordinate System

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How can we check schema?

Key Tools

- Schema (Any Format) Reader
- FeatureTypeFilter
- StatisticsCalculator
- AttributeClassifier transformer
- XMLValidator Transformer
- JSONValidator Transformer

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What can we check?

☑ Attribute Values

- Values exist
- Data Type (numeric, alpha etc)
- Value within in range
- No duplicates

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How Can we Check Attribute Values?



Key Tools

- Tester and TestFilter
- AttributeClassifier
- AttributeRangeFilter & AttributeFilter
- NullAttributeMapper
- Matcher
- DuplicateRemover
- StringSearcher
- StatisticsCalculator

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What can we check?

- ☑ Geometry 2D and 3D
 - Intersections
 - Orientation
 - Duplicate Vertices
 - Missing Surface Normals
 - Invalid Solid Voids
 - etc

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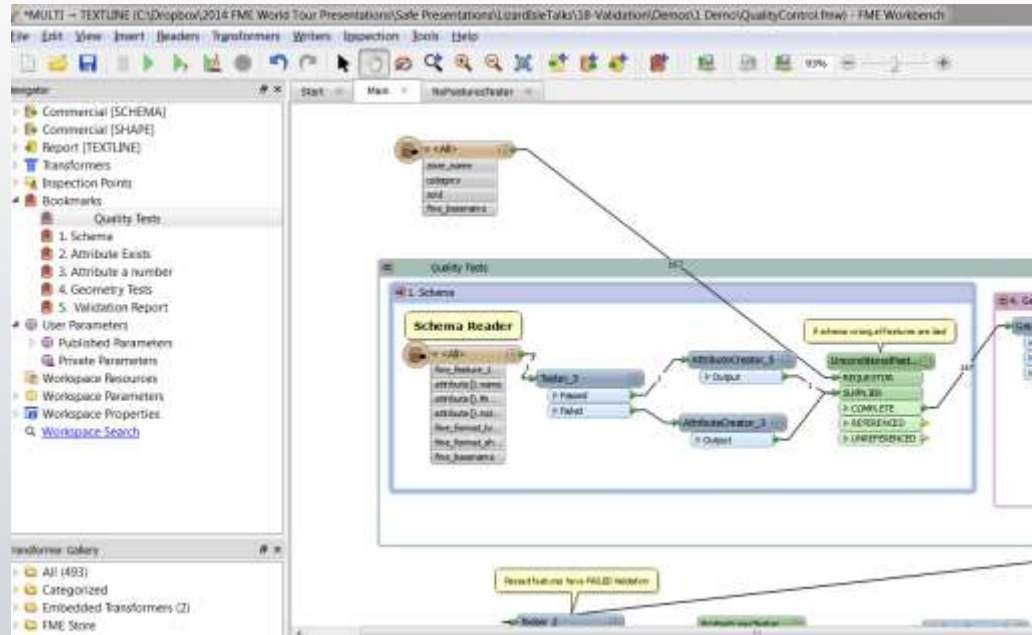
How can we check geometry?

Key Tools

- GeometryValidator (12 tests and counting)
 - Detection and repair
 - old transformers bundles in eg Self-Intersector
- GeometryFilter
- Matcher
- SpatialFilter (Sweco example)
- SliverRemover & SpikeRemover
- AreaCalculator & LengthCalculator
- OrientationExtractor

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Workspace Example



Demo 1 – FME Workbench

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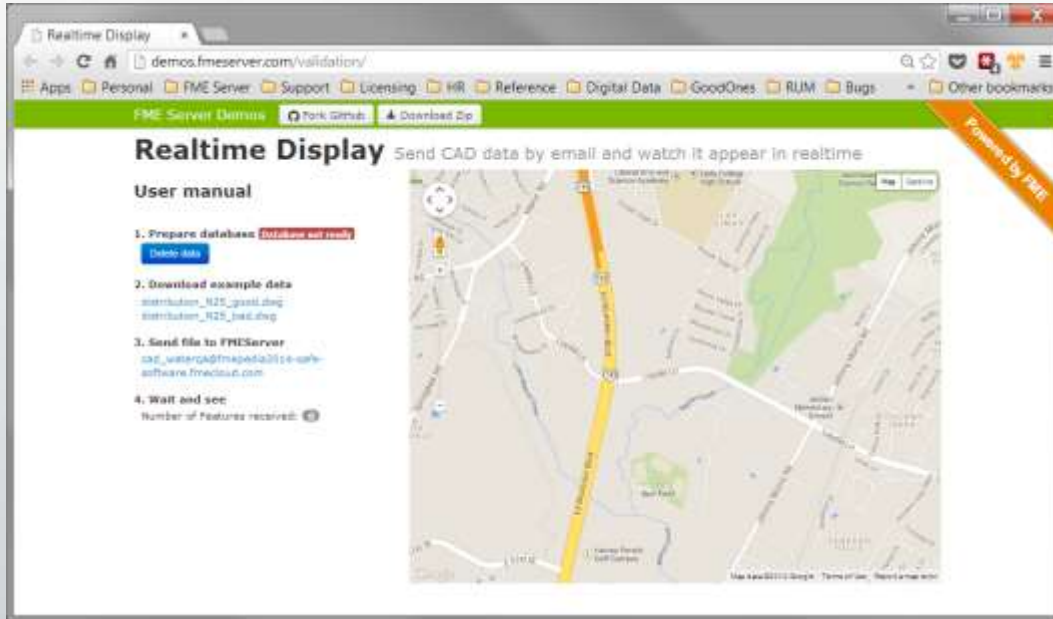
Validation Workflows on FME Server



- Submit data via email, upload, directory watcher, scheduled task
- Provide report or results via email, form, data download, PDF

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Validation Workflows on FME Server



Demo 2 – FME Server

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Partner Validation Examples

#1 Axmann CheckGeo



1. Users upload data
2. Workspaces Check Schema, Geometry, Attributes
3. Email sent with [PDF Report](#) and Bad Data in [AutoCAD](#)



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Partner Validation Examples

#1 Axmann GeoChecker



Detailed Reports & AutoCAD File of Errors

The screenshot displays the Axmann GeoChecker software interface. On the left, a 'Prüfprotokoll' (Check Protocol) report is shown, detailing the project information and statistics. The report includes fields for FME Job ID, Project Name, Check Date, User, and various statistics such as the number of features and objects passed. On the right, the AutoCAD interface is visible, showing a CAD drawing of a site plan with various features and dimensions. The AutoCAD window title is 'DraftSight - [CAD_bsdwg]'. The interface includes a menu bar, a toolbar, and a Properties panel on the left side of the drawing area.

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Partner Validation Examples

#2 Veremes - Qualigéo



- Generic Approach to avoid “Chamber of Horrors”

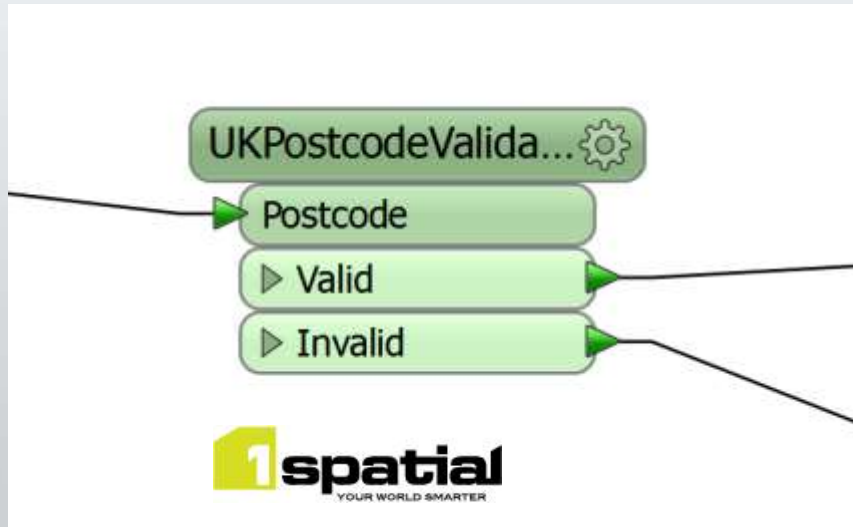


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Partner Example #4



- 1Spatial - UKPostcodeValidator



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FME and Real Time Data



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Two Types of Real-Time Data

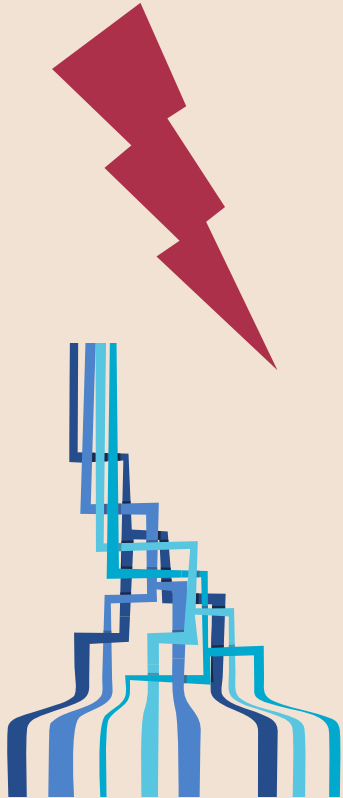
1. Event Based or Notification Based

Independent discrete events that occur at a rate of:

< 1 message / second

Continuous Data Stream

High Velocity Data **Stream** of > 1 message / second.





Real-Time #1: Notifications

Real-Time #1 - Notifications

Notifications all follow the same pattern:



Something happens

> TOPIC >



FME Workspace is run

> TOPIC >



Output is delivered

Notification Service – Sample Workflow

FTP - Report - Email

Publisher
(FTP)

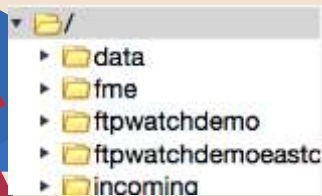
Workspace

Subscriber
(Email delivery)

> TOPIC >

> TOPIC >

FTP



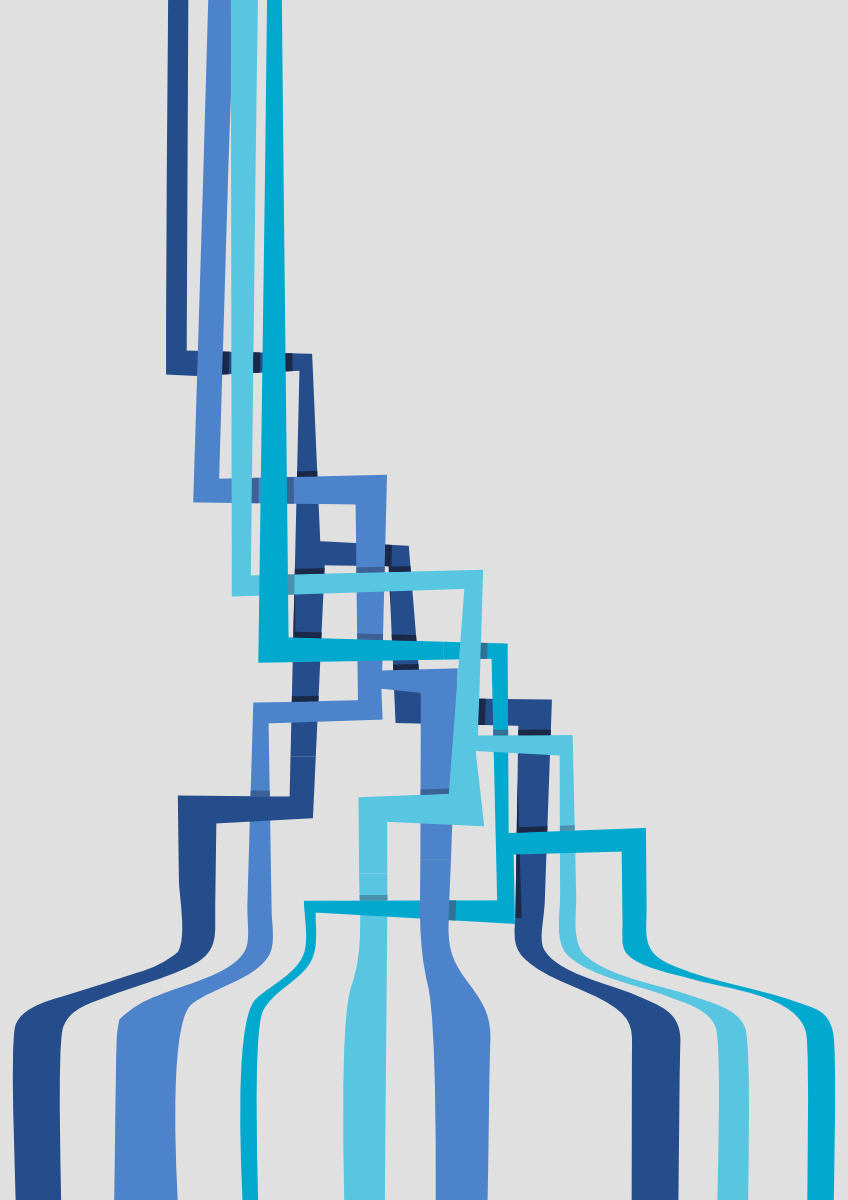
Create a
Report



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Real-Time #2

Data Streams





**FME Engine(s)
directly
connected to
data stream.**

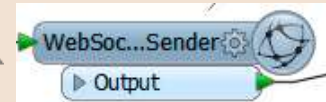
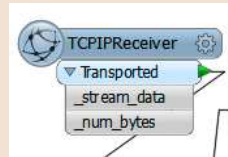
Data Streams Example Workflow

Device

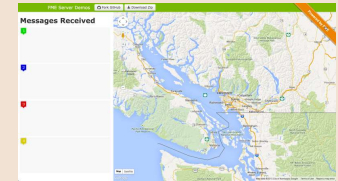
Workspace
ALWAYS RUNNING

Web App

TCP/IP



WebSockets



DEMO

Supported Direct Connections

HTML5 WebSockets

Java Message Service (JMS)

Amazon Simple Queue Service (SQS)

TCP/IP

JMS / WebSockets Demo

FME Server Demos [Fork GitHub](#) [Download Zip](#)

Messages Received

- 1
- 2
- 3
- 4

Powered by FME

Map Satellite

Map data ©2018 City of Kamloops, Google. Terms of Use Report a map error

Performance & Profiling



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It is all about *Time!*





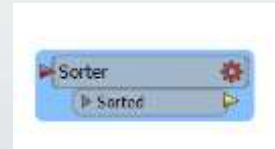
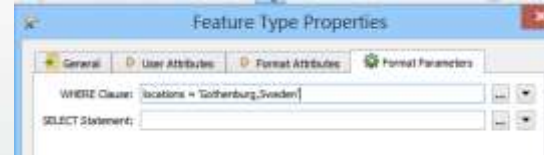
What is taking so long?



Improving Performance



- Use the Database
- Blocking Transformers
- Live Feature Counts
- Log File Options



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Profiling



- Shows how much time in each “Factory”
- To turn it on:

Select “Tools | Edit Header”

- Add line at the top:

```
FME_PROFILE_RESULT_CSV <file path>
```

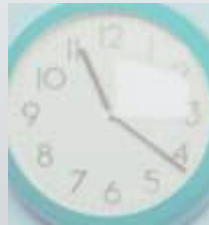
- Get a file like slide “FME Profile Result”.

DEMO

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http://fmepedia.safe.com/articles/How_To/Performance-Tuning-FME



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Thank You!

- Questions?



Summary of What's Great in FME Desktop



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Workbench - Dynamic!

- Dynamic Feature Counting
- Run with Full Inspection
- Automatic Attribute Schema
- Object resizing
- Undo history tree
- Syntax highlighting for scripting
- Snap to grids and guides
- Attribute merging
- Order writers by workspace position



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Formats - 3D & BIM

- IFC (writing)
- CARIS CSAR Point Cloud
- Minecraft (read and write)
- OpenSceneGraph
- TetGen



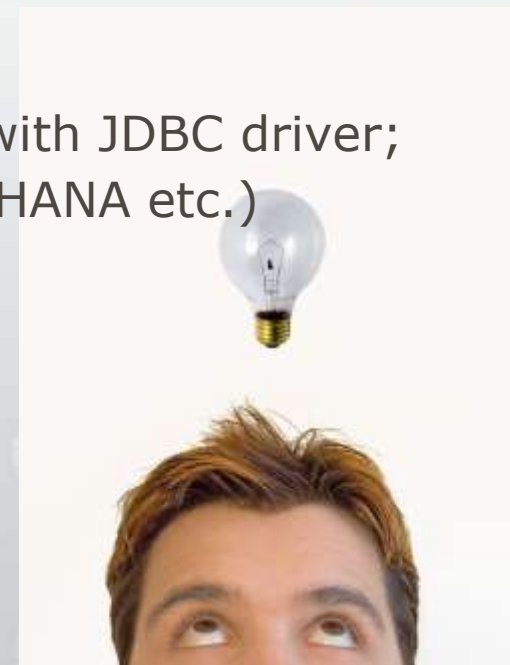
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Formats - Business Intelligence

- Sharepoint Lists
- Socrata REST
- JDBC Read/Write (non-spatial formats with JDBC driver; rssbus.com, Faircom, EXtremeDB, SAP HANA etc.)
- Word ([FMEPedia](#))
- OData Reader 2.0
- Oracle Database Cloud



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Formats - Spatial

- GME Raster Reader (Reader/Writer since 2014)
- ArcGIS Feature Service reader/writer
- Oracle Database Cloud
- CartoDB
- MBTiles
- WMTS
- SXF Panorama exchange (Russia)
- Land Victoria Incremental Update Format (Australia)
- OGC GeoPackage
- Three.js (JSON Templater)

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Transformers



- PDFPageFormatter
- TableAdder (FME Store)
- ChartGenerator
- HttpCaller
- FTPCaller
- TweetStreamer
- GoogleMapsEngineStyle
- S3...
- XMLAppender
- GMLFeatureComposer
- GeoRSSFeature..
- SharedItem...
- TraitMerger
- PointCloudMerger
- PointCloudStatistics..

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Thank You!




- Questions?
- For more information:
 - Ken.Bragg@safe.com

@kenatsafe  #FMEWT

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Thank You!



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